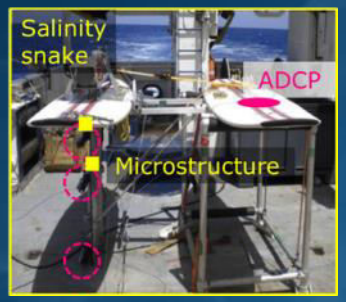
RR1610 Planning Meeting

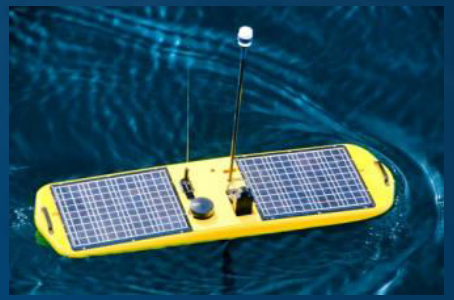


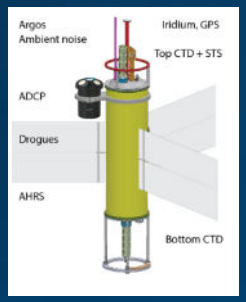
SPURS-2 Cruise

San Diego

20 Apr 2016

Andy Jessup and Kyla Drushka
APL-UW





RR1610: Logistics

- Honolulu: Berthing location TBD
  - New UH Marine Center at Pier 35 (preferred)
  - Commercial berth at Pier 34
  - Ship's agent information available now on web site
- Meals & bunks
  - Available from 1200 on 7 Aug
  - Meals may be limited in port
- Mobilization
  - Start 1200 on Monday 8 Aug
  - End Thursday 11 Aug
- Cruise start: 1600 Friday Aug 12
  - All participants recommended to be on board night of 11 Aug
  - Latest arrival should be 0900 on 12 Aug for 1600 departure

Primary Activity

- Deploy three moorings
  - WHOI – Central, PMEL – North, PMEL – South
- Deploy Autonomous Drifting and Maneuverable Assets
  - Drifting: Argo/APEX floats, Mixed-Layer Float, SVPS and SWIFT floats
  - Maneuverable: Seagliders, Wave gliders, Ecomappers
- Hydrographic Survey
  - Underway CTD
  - CTD stations to 1000 m every 0.5 deg
- Ship-based measurements
  - Flux measurement package mounted on the jackstaff
  - Temperature (unpumped) and Salinity (pumped) Snake
  - SSP – Surface Salinity Profiler (surface towed body)
  - LTAIRS – Lighter-than-Air IR System (balloon)
  - Controlled Flux Technique: CO_2 laser heating surface viewed with IR
  - RUMP: Rotating Universal Mounting Platform with Echosounders

RR1610 Cruise R/V *Roger Revelle*

- 5 Aug: R/V Revelle arrives Honolulu
- 8 Aug: Begin mobilization
- 12 Aug: Depart Honolulu
- 12-19 Aug: Transit, at least one test deployment
- 19 Aug: Arrive study site, begin scientific operations
  - Days 1-5: Mooring deployment
  - Days 6-18: 3x3 box survey, deploy floats and gliders
  - Days 19-26; 125 W survey
- 14 Sep: Conclude operations, depart study site
- 22 Sep: Arrive Honolulu 0800
- 24 Sep: Conclude demobilization

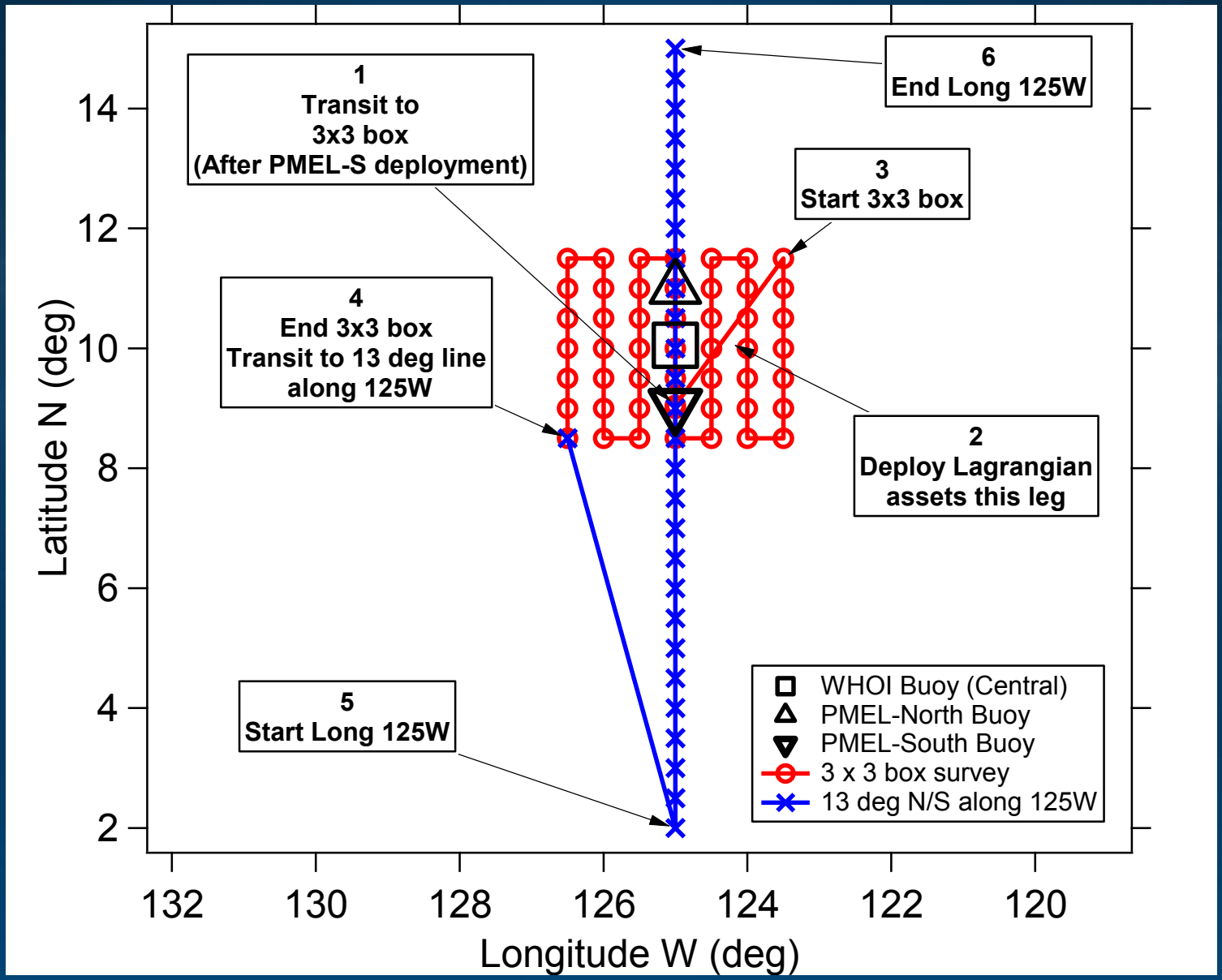
Hydro Survey + Ship Sampling

- TAO rain data: Expect to encounter 3-6 rain events in 3 weeks
  - Access to ship's radar to look for rain – can it be recorded?
- Hydrographic Survey
  - Multiple meridional transects focused around 125 W, 10 N
  - One transect from 2 N to 15 N along 125 W
  - Underway CTD
  - CTD/LADCP stations every 0.5 deg
- Air-sea fluxes - main constraint is pointing into the wind
- Towed Salinity Snake - Can operate underway at all speeds
- Towed Surface Salinity Profiler (SSP) and Lighter-than-Air IR System (LTAIRS)
  - Main constraint is towing at 4 knots

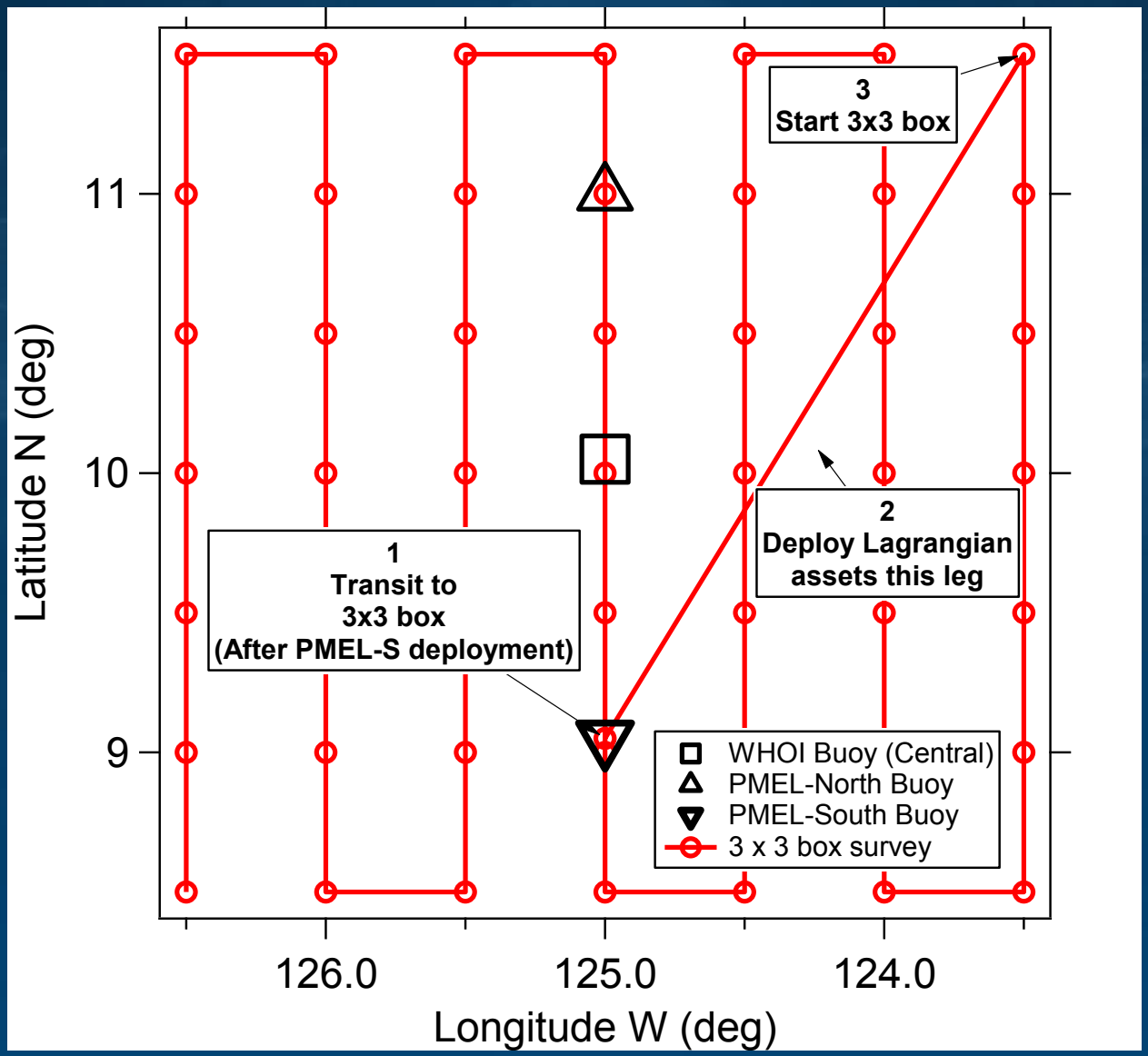
Ship Sampling Strategy

- Conduct hydro survey as usual except when rain is present
  - When rain occurs
    - Stop ship to deploy SSP, LTAIRS, and SWIFT drifters for duration of event
    - Tow SSP: Into the wind as possible, spatial survey as appropriate
    - Suspend CTD stations, uCTD deployment continues if OK with Captain
  - When rain event ends
    - Stop ship to recover SSP, balloon, and SWIFT drifter
    - Resume CTD survey (backtrack, account for delay)
- If rain is not encountered after several days, want to tow SSP between stations to sample remnant rain & background
- Time budget for hydro survey for planning purposes
  - 75% of distance at 10 kts
  - 25% of distance at 4 kts

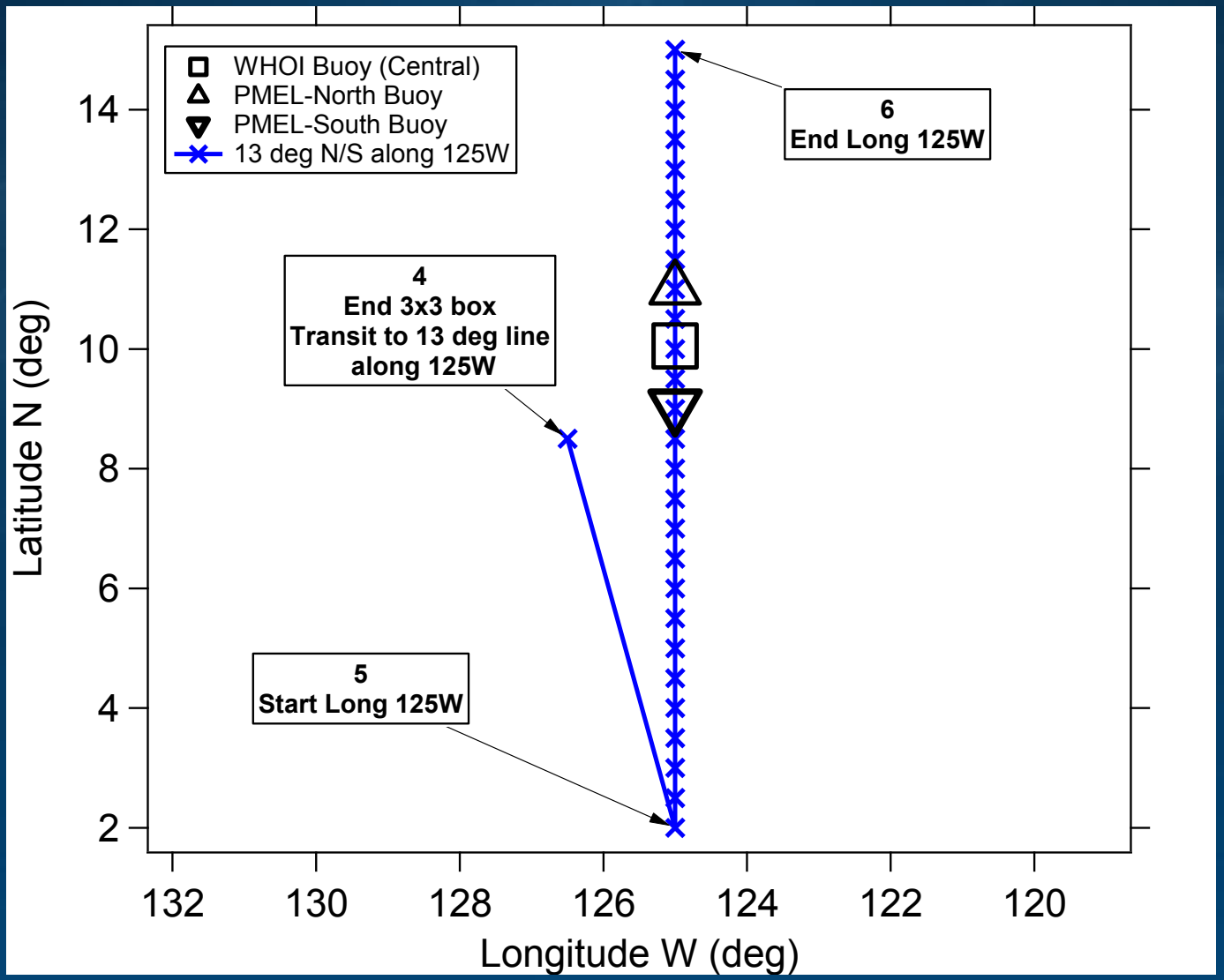
Hydrographic Survey



3 x 3 Box Survey



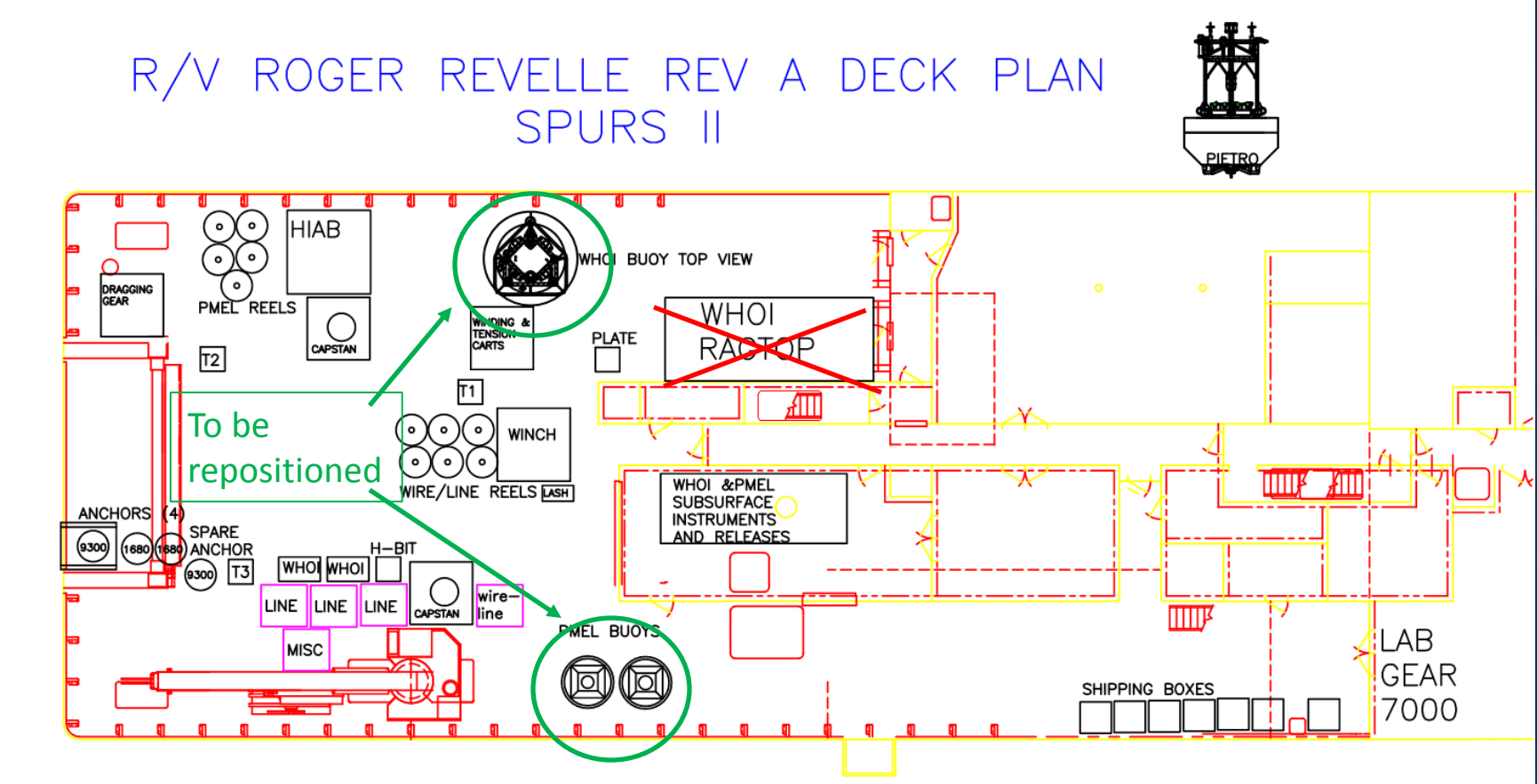
125 W Transect



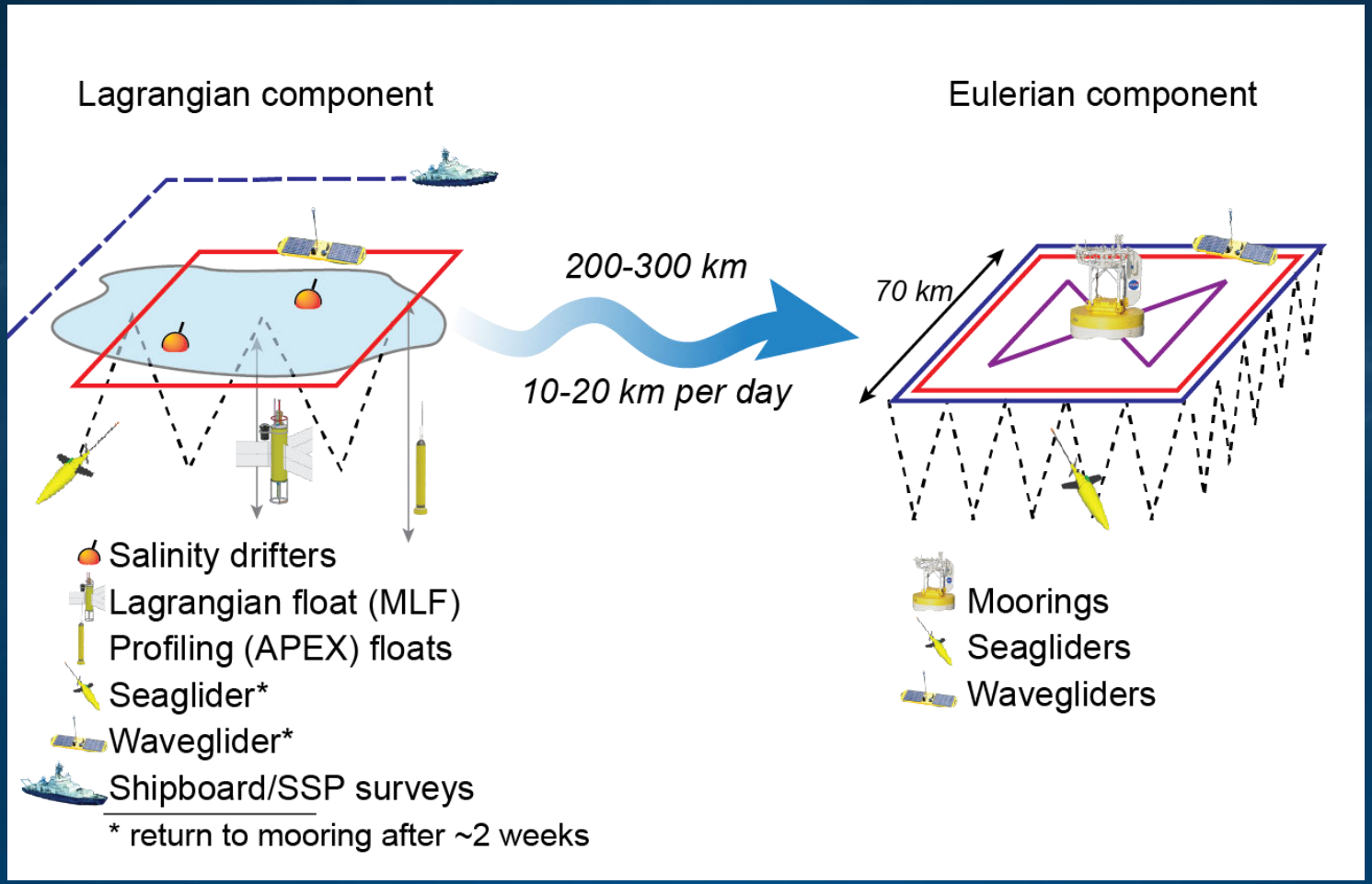
Mooring Deployment

- Mooring deployment time
  - WHOI: 9 hours
  - PMEL (2): 6 hours each
- Additional requirements
  - Full depth (4650 m) CTD to check depths and sensors
    - 4 hours
    - Can be done at night or days after deployment
  - Anchor survey
    - 2 hours
    - Square, 2 miles per side, 10 min each location, avg speed 6 kts
  - Met sensor check
    - 24 hours standby WHOI central mooring pointed into the wind
    - Could be combined with a SSP/LTAIRS butterfly survey
  - Tether SPIP-2 and SURPACT (floats) to WHOI mooring

Mooring Deck Layout



Drifter Component



Drifter Deployment Strategy

- Search for suitable location from PMEL-S to start of 3 x 3 box (rain, rain forecasted, etc.)
- Deploy assets: 9-10 hrs
  - MLF (2 h), SVPS drifters (1-2 h), Argo/APEX
  - Wave glider (4 h), Seaglider (2 h)
- SSP/LTAIRS survey: 12-24 hrs
- Continue to 3 x 3 box survey
- Seek to encounter later in survey

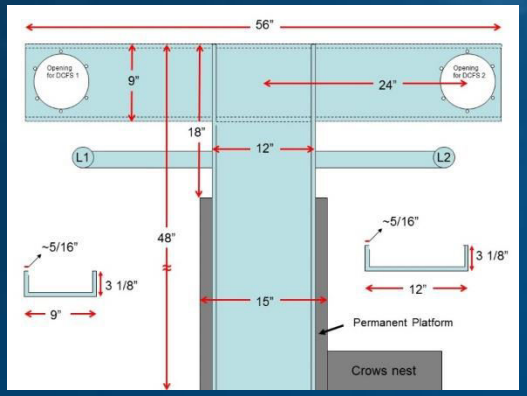
Air-Sea Flux Measurements

- Direct Covariance - 2 systems on jackstaff
- Rain gauges, radiometers, skycam: 02/03 decks
- Sea snake – surface temperature sensor
- Rawinsonde Launches
  - Twice daily, Launch from fantail
  - Need ship's bottle racks
  - Method to transmit data to the GTS
- Meteorological sensors on A-frame

Met Sensors on Jackstaff

Similar Setup as on Revelle in Dynamo

- Attach boom to existing platform
- Relocate ship sensors to mast top
- Add platform for laser altimeter/disdrometer
- Additional sensors on 02 and 03 decks
- Access to fresh water hose 02 deck
- Cable routing through bosun's locker with room for power supplies



Underway CTD

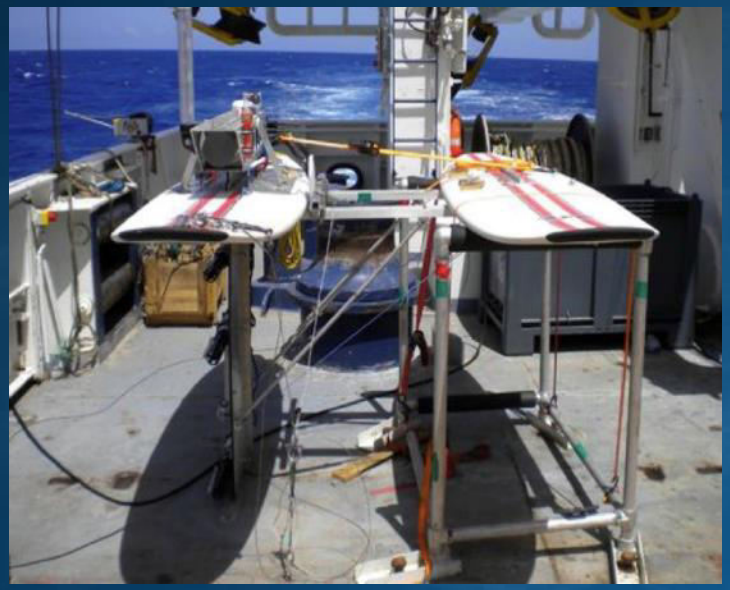
Location

- Aft port corner
- Locate as far aft as possible
- Requires 6’ of space along rail
- Attached to 2’ centers
- Remove railing if possible ?

Operation

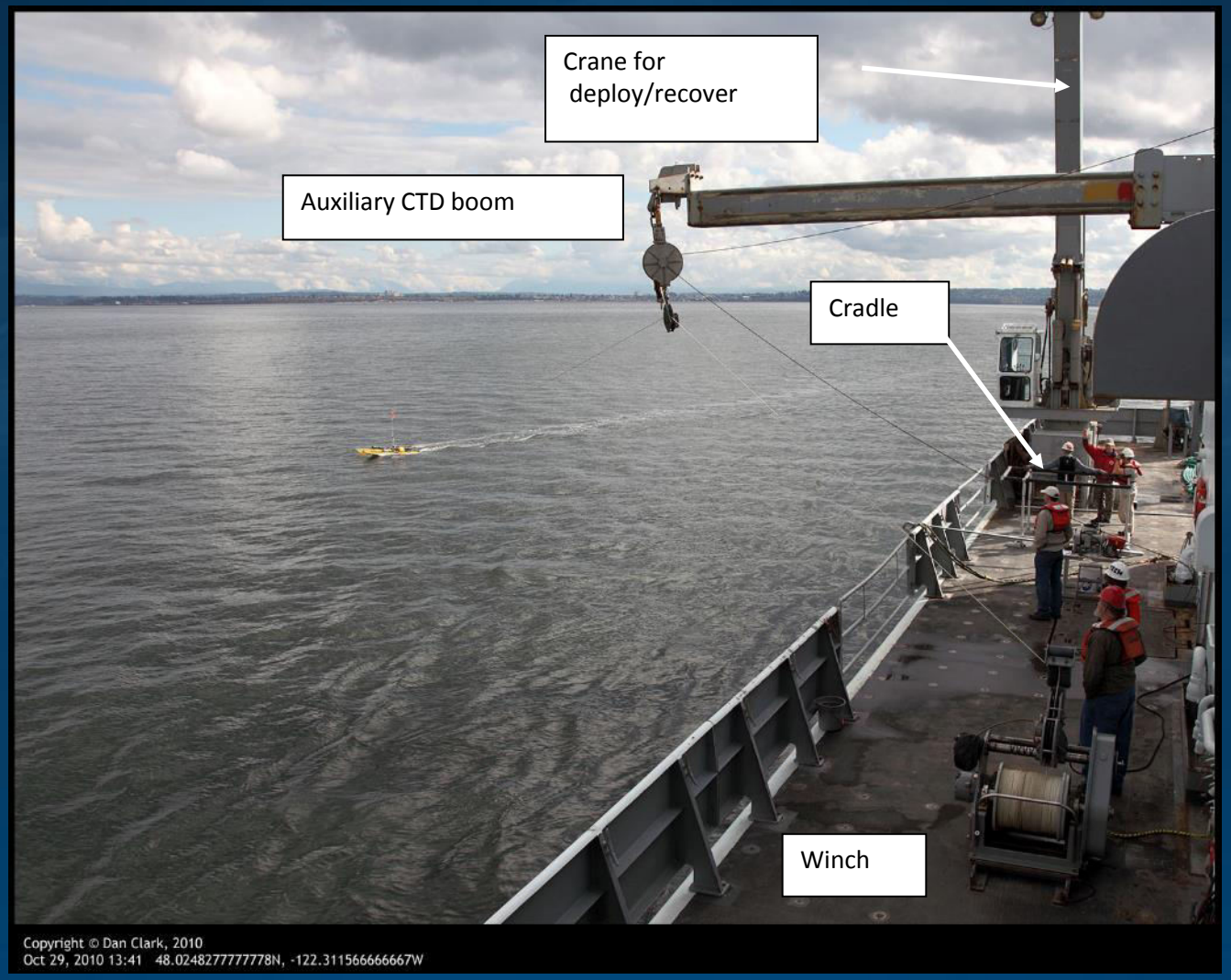
- Continuous during hydro survey
- Request to deploy while towing SSP

SSP: Surface Salinity Profiler



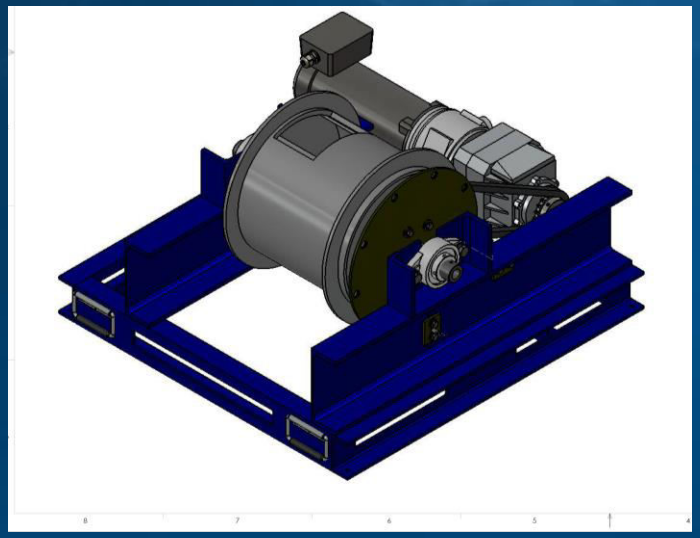
- Sea Snake
- 3 x SBE-49 FastCTD (0.1, 0.5, 1.0 m)
- Turbulence probe
- ADCP
- Generator – requires gasoline storage

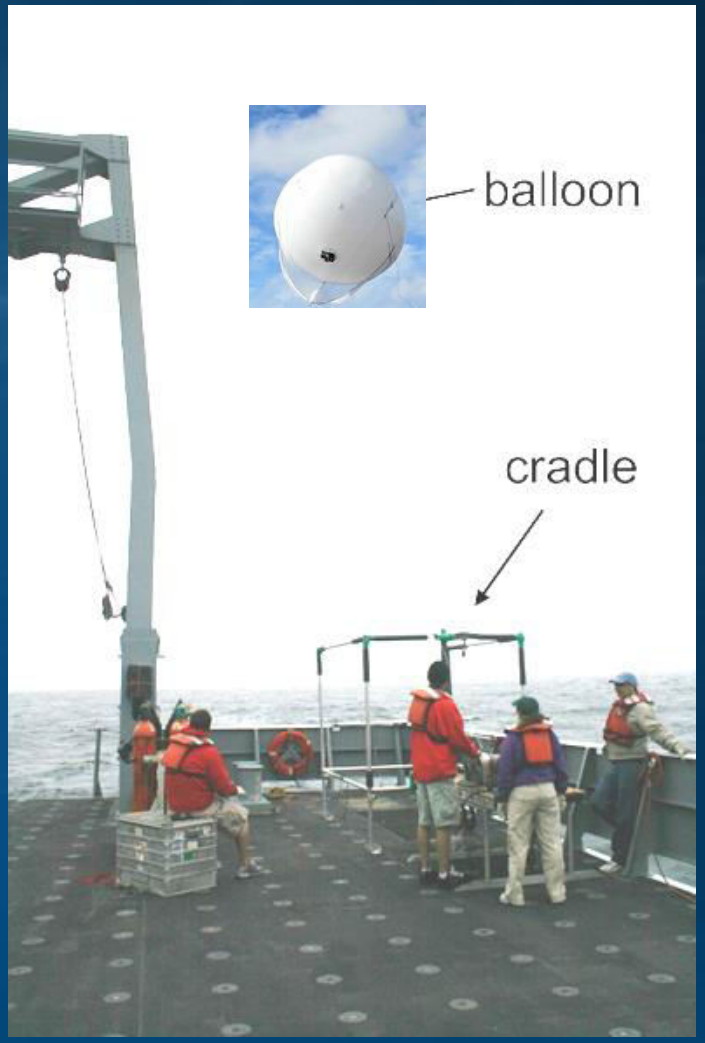
SSP Deployment



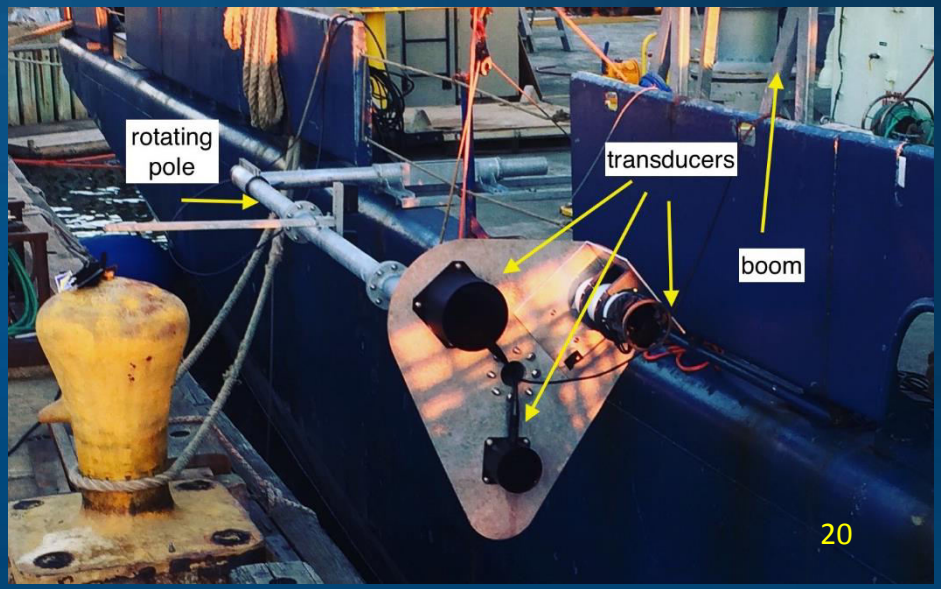
LTAIRS – Lighter-than-Air IR System

Items	Spec.
Drum Size (Flange x Core x Width):	17" x 14" x 12"
Motor:	LEESON 1.0HP 1750RPM 90VDC Stainless Steel Motor
Gearbox:	LEESON P7472 In-line Aluminum Gearbox (44.23:1)
Drive Sprocket:	40B18
Drum Sprocket:	50A60
Cable Size:	750 ft of 7/64" Spectra Rope
Levelwind Drum Sprocket:	
Levelwind Gearbox Input Sprocket:	
Levelwind Gearbox Output Sprocket:	
Reversing Screw Sprocket:	
Emergency Stop Switch:	
Electric Brake:	LEESON 6ft-lb WASHGUARD Coupler Brake
Slip Ring:	
Revision Note :	
Winch S/N:	
Winch Weight (lbs.):	252

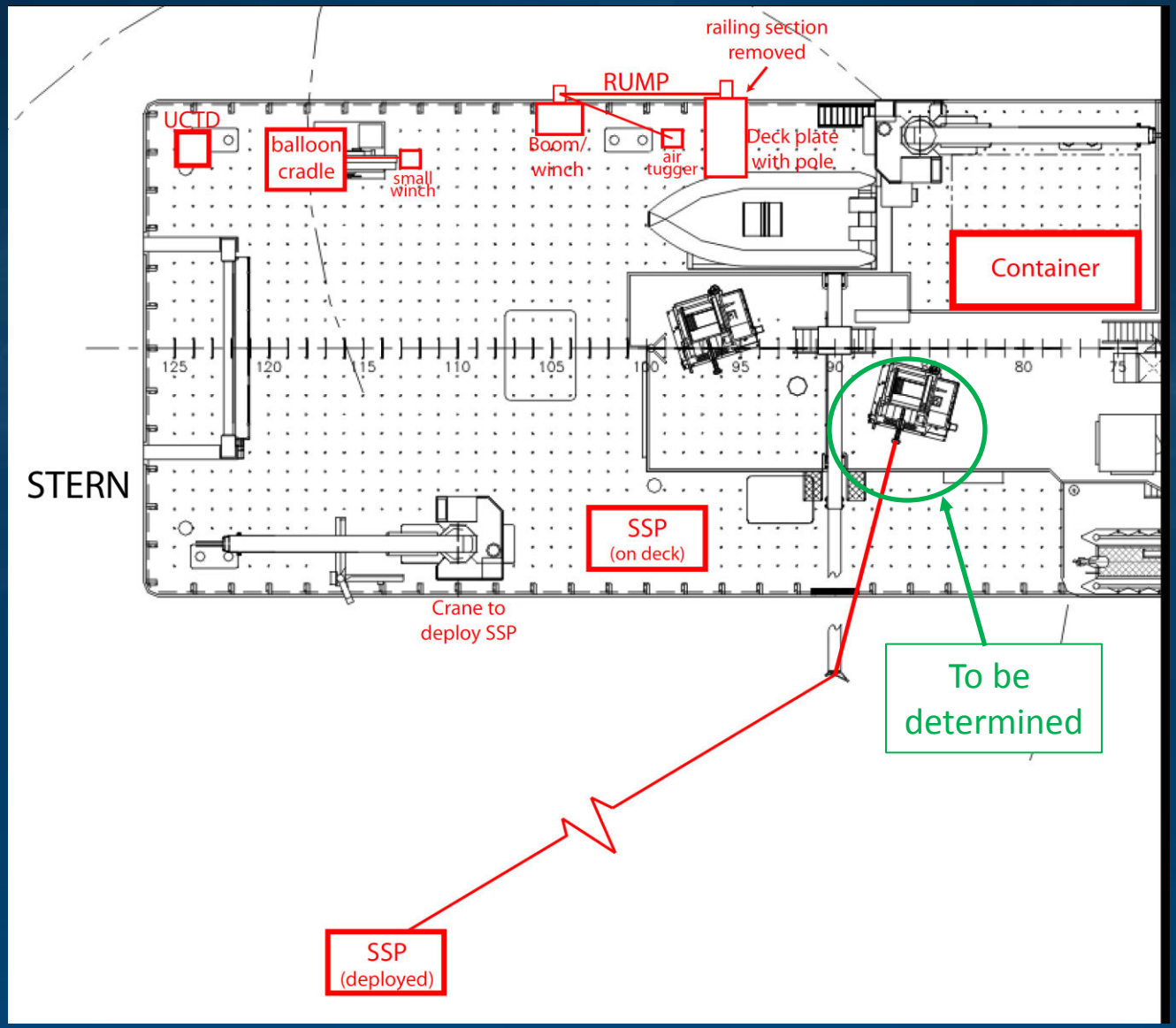




RUMP
Rotating Universal Mounting Platform

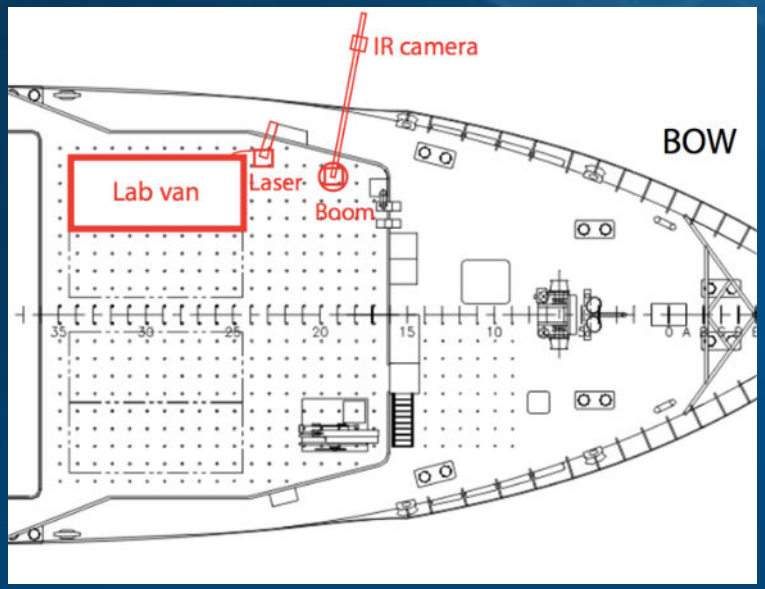


Stern Deck Layout



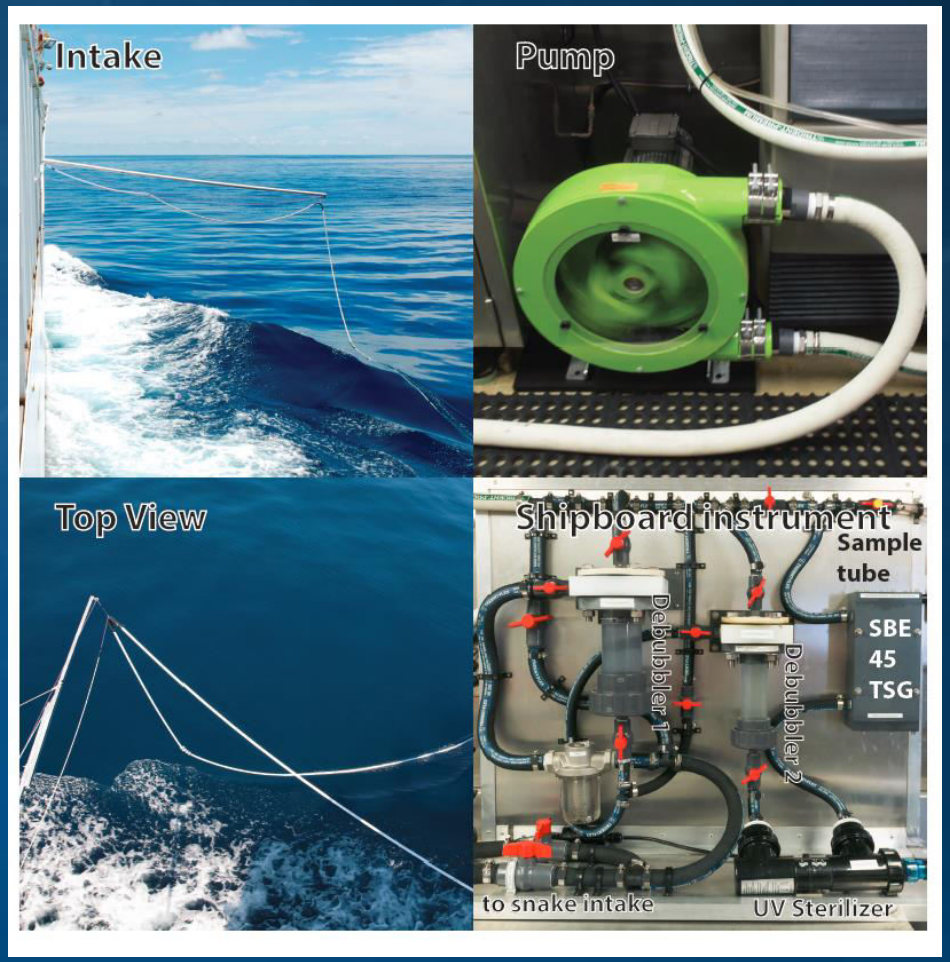
CFT: Controlled Flux Technique

- CO_2 laser heats small spot on ocean surface
- IR camera used to measure decay time
- Van on forward 02 deck
  - CO_2 laser and cooling system on deck
  - Boom to hold IR camera
  - Need continuous seawater supply 3 gal/min



Salinity Snake

- Samples near surface water
- Water pumped to laboratory
- Deploy continuously



Issues to Address - 1

- Deck Layout
  - Move HIAB crane, capstan, cleat for LTAIRS location
  - SSP location
  - RUMP location
  - uCTD location
- Deploy uCTD while towing SSP
- Add met sensors to A-frame
  - Mount in port
  - Remove during mooring operations if necessary and able to climb A-Frame at sea
- Small boat operations

Issues to Address - 2

- CO_2 Laser Issues
  - Safety Plan approval
  - Seawater supply for cooling 3 gal / min, 02 bow
  - 208 V, 3-phase, 30 A
- Helium storage
  - Need ship racks for 8-12 bottles for rawinsondes
  - APL to bring 2x8 bottle racks, may need more
- SSP Winch
- Access to ship's radar, recording capability?